REMARKS

Claims 101-105, 107-112 and 123-130 are pending in this application. By this Amendment, claims 101, 103, 105, 108, 110 and 123 are amended for clarity. No new matter is added.

I. The Claims Are Patentable Over The Applied References

A. Roitman In View Of Ra

The Office Action (1) rejects (§4) claims 101-104 under 35 U.S.C. §103(a) over U.S. Patent No. 5,972,419 to Roitman in view of U.S. Patent No. 5,874,200 to Ra et al. (Ra); and (2) rejects (§11) claims 124-125 under 35 U.S.C. §103(a) over Roitman in view of Ra, and further in view of Japanese Patent Publication No. 07-153574 to Kaneko. Applicants respectfully traverse the rejections.

Regarding independent claim 101, the applied references fail to disclose or suggest "enhancing a liquid repellency of an upper surface of the solid insulating layer, while the solid insulating layer is in a solid state", and "the upper surface of the solid insulating layer having a greater liquid repellency than a liquid repellency of the inner wall of the solid insulating layer. "

Regarding independent claim 103, the applied references fail to disclose "enhancing a liquid repellency of an upper surface of the insulating layer after patterning the insulating layer so that the upper surface of the insulating layer has a greater liquid repellency than a liquid repellency of the inner wall of the insulating layer. "

Roitman discloses a method of making a passive matrix-type display that includes forming a mask 131 that defines the locations of pixels on a bottom electrode 132 (Fig. 2; col. 3, lines 29-33); and depositing droplets 138 in the wells in mask 131. Droplets 138 are an electroluminescent material (col. 3, lines 41-43).

Regarding independent claims 101 and 103, the Office Action acknowledges that Roitman fails to disclose "enhancing a liquid repellency of an upper surface of the solid insulating layer", but alleges that Roitman discloses, in one embodiment, forming insulation layers on the substrate to confine the droplets, and, in another embodiment, forming hydrophilic or hydrophobic regions on the substrate to confine the droplets 138. The Office Action does not provide citations to these embodiments of Roitman. The Office Action alleges that it would have been obvious that using these two embodiments together would further ensure the confinement of the droplets, and alleges that it would have been obvious to use insulating layers in conjunction with forming hydrophilic and hydrophobic regions on the substrate to further ensure confinement of the droplets.

Roitman discloses forming mask 131 that defines the locations of pixels on a bottom electrode 132 in Fig. 2 and at col. 3, lines 29-33. Roitman discloses, as an alternative embodiment to using mask 131 to contain the droplets 138, using "hydrophilic or hydrophobic regions so that the droplets 138 are confined by surface tension" (col. 4, lines 55-59).

Applicants respectfully assert that the Office Action's proposed combination of the two embodiments of Roitman would not have been obvious. First, Roitman indicates that the use of hydrophilic or hydrophobic regions is an alternative to use of mask 131. Second, under the Office Action's proposal, the substrate 101 would be modified to include the hydrophilic or hydrophobic regions and the mask 131. In this modification, mask 131 would be formed on top of the hydrophobic/hydrophillic regions because Roitman discloses that the hydrophobic/hydrophillic regions are formed on the substrate[1]. Because the hydrophobic/

[1] The Office Action alleges that, as Roitman uses xylene as a solvent, the droplets would be attracted to hydrophobic regions. Thus, under this interpretation, the mask 131 would be on top of hydrophilic regions.

hydrophilic regions would be covered by the mask 131, the hydrophobic/ hydrophilic regions would not add any benefit to confining the droplets 138. Moreover, the addition of hydrophobic regions under the mask 131 would have a detrimental effect of repelling the liquid of the droplet at the bottom interface between the wall of the mask 131 and the substrate 101. That is, the addition of the hydrophobic regions under the mask 131 would likely cause undercuts to form at the bottom sides of the electroluminescent layer 108 (see Fig. 2).

Even if the proposed combination is made, all the claimed features could not result because Roitman discloses, as acknowledged by the Office Action, that the surface of the substrate 101 would be made hydrophobic, not the surface of the mask 131. Roitman does not disclose making the surface of the mask 131 hydrophobic. Thus, the Office Action is basing the rejection on Applicants' disclosure, using impermissible hindsight, cobbling together features of Roitman in a manner not suggested by Roitman.

Further regarding independent claims 101 and 103, the Office Action acknowledges that Roitman fails to disclose enhancing the liquid repellency by use of ultraviolet radiation, but cites to Ra as disclosing this feature. As discussed in the September 19, 2008 Amendment, one of ordinary skill in the art would not have modified Roitman as proposed because: (i) in the embodiment in which mask 131 is retained in the finished display 100 (Fig. 1), causing the mask 131 to be repellent to liquids likely would be detrimental in the formation of electron transport layer 106 over the mask 131; (ii) Roitman does not disclose that there is a problem with mask 131 containing the electroluminescent materials deposited as droplets 138; and (iii) one of ordinary skill in the art would recognize that mask 131, as a physical barrier, would have no difficulty containing the droplets 138 because gravity would ensure that the electroluminescent material would not exit from the regions between the walls of mask 131 (See Fig. 2 of Roitman showing that mask 131 extends above the height of the

droplets in wells 133). Thus, it is clear why Roitman discloses the use of hydrophilic or hydrophobic regions as an alternative to the use of mask 131. Thus, for these reasons, one of ordinary skill in the art, taking the applied references as a whole, would have had no reason to modify mask 131 to be hydrophobic because this modification would provide no benefit over mask 131 taught by Roitman, while adding the detriments of extra cost, extra manufacturing steps, extra time of manufacture, and extra complexity.

In the Response to Arguments section, the Examiner states that the arguments of the September 19, 2008 Amendment are not persuasive because one of ordinary skill would have recognized that the use of both methods together would have been operable and would have resulted in increased isolation. As discussed above, one of ordinary skill would not have regarded the two Roitman embodiments as being useful together and, even if they would have been combined, one of ordinary skill would have understood that no further isolating effects would be provided over the use of mask 131 alone (see again Roitman Fig. 2 where the electroluminescent material does not even reach to the tops of the mask 131).

Still further regarding independent claims 101 and 103, the Office Action acknowledges that Roitman fails to disclose an order between patterning an insulation layer and enhancing the liquid repellency of the insulating layer, and alleges that it would have been obvious to select the claimed order. However, as discussed above, Roitman discloses forming hydrophobic regions on the surface of substrate 101, not forming hydrophobic regions on the top of mask 131. In alleging that Roitman suggests forming hydrophobic regions on the top of mask 131, the Office Action is alleging that Roitman discloses something not present in Roitman. That is, the Office Action is mischaracterizing Roitman. Even if the two embodiments, one in which mask 131 is used and one in which hydrophobic/hydrophilic regions are used, are combined, because Roitman discloses that the hydrophobic regions are formed on the surface of substrate 101, and thus must be under mask

131, the order of application would have to be (1) forming the hydrophobic regions, and (2) forming mask 131. Thus, even if the two embodiments of Roitman would have been combined, the order of patterning the insulating layer and enhancing a liquid repellency as claimed in independent claim 103 would not result.

Still further regarding independent claims 101 and 103, the Office Action acknowledges that Roitman fails to disclose enhancing a liquid repellency of an upper surface of the solid insulating layer so that "the upper surface of the solid insulating layer ha[s] a greater liquid repellency than a liquid repellency of the inner wall of the solid insulating layer" but alleges this would result from the application of UV radiation. As discussed above, it would not have been obvious to modify Roitman by Ra. Further, even if the references would be combined as proposed, the combination would result in the substrate of Roitman being irradiated to enhance the liquid repellency in regions on the substrate, as disclosed by the cited embodiment of Roitman having hydrophobic and hydrophilic regions, not the surface of mask 131. Thus, the Office Action appears to be engaging in impermissible hindsight using Applicants' claims as a roadmap to allege features in the proposed combination that would not result if one of ordinary skill would have combined the references based on the disclosures of the references as a whole.

For the foregoing reasons, Applicants request withdrawal of the rejections.

B. Roitman in view of Tsuchiya

The Office Action (1) rejects (§5) claims 101-104 and 129-130 under 35 U.S.C. §103(a) over Roitman in view of U.S. Patent No. 5,536,603 to Tsuchiya et al. (Tsuchiya); and (2) rejects (§12) claims 124-125 under 35 U.S.C. §103(a) over Roitman in view of Tsuchiya, and further in view of Kaneko. Applicants respectfully traverse the rejections.

Regarding independent claim 101, the applied references fail to disclose or suggest "enhancing a liquid repellency of an upper surface of the solid insulating layer, while the solid

insulating layer is in a solid state", and "the upper surface of the solid insulating layer having a greater liquid repellency than a liquid repellency of the inner wall of the solid insulating layer."

Regarding independent claim 103, the applied references fail to disclose or suggest "enhancing a liquid repellency of an upper surface of the insulating layer after patterning the insulating layer so that the upper surface of the insulating layer has a greater liquid repellency than a liquid repellency of the inner wall of the insulating layer."

The Office Action cites to Tsuchiya at col. 7, lines 49-57. Tsuchiya discloses forming resist patterns 4 on a quartz substrate 1 (Fig. 9A) and exposing the substrate 1 to CF_4 gas that is energized to generate a fluorine plasma (col. 7, lines 49-57). This results in the surface energy of the resist patterns 4 being decreased. In operation, a liquid phase deposition (LPD) film is applied to the substrate 1, but the LPD film does not grow on the resist patterns 4 due to the changed surface energy of the resist patterns 4 (*id.*). Because Tsuchiya discloses forming the resist patterns 4 prior to exposing them to the fluorine plasma, both the sides and top of the resist patterns 4 are surface treated (Fig. 9A).

It would not have been obvious to modify Roitman by Tsuchiya. Roitman discloses making an electroluminescent display that includes forming mask 131 on a bottom electrode 132 and applying electroluminescent droplets in the wells of the mask 131. Tsuchiya discloses making a phase shift mask that includes forming resist patterns 4 on quartz substrate 1, treating the resist patterns 4 by a fluorine plasma, and forming an SiO_2 film between the resist patterns 4. Tsuchiya discloses using the fluorine plasma treatment to prevent the SiO_2 film from growing on the resist patterns 4. It would not have been obvious to modify Roitman by Tsuchiya because Roitman's mask 131 is not formed on a quartz substrate, and Roitman does not disclose that there is a problem that the electroluminescent material "grows" on mask 131. Further, the electroluminescent droplets are applied within the wells of

mask 131, and the walls of mask 131 extend above the height of the electroluminescent layer. Thus, as discussed in relation to the proposed modification of Roitman by Ra, there would be no benefit in modifying Roitman by Tsuchiya.

Further, the Office Action is not clear as to how the references could be combined. The Office Action appears to cite Roitman as disclosing all the features as discussed in the rejection over Roitman in view of Ra, discussed above (Office Action, section 3, "Roitman is discussed above ..."). Under this interpretation, the applied references fail to disclose the features quoted above for independent claim 101 because Tsuchiya fails to disclose exposing resist patterns 4 to a fluorine plasma prior to patterning the resist patterns 4. Further, the applied references fail to disclose the features quoted above for independent claim 103 because Tsuchiya discloses treating the surface of both the sides and the top of the resist patterns 4.

Even if Roitman is modified by Tsuchiya, the proposed combination fails to disclose the features quoted above because Tsuchiya discloses that the fluorine plasma treatment is applied to both the sides and top of resist patterns 4 (Fig. 9A-9B). Thus, the features quoted above would not result from the proposed combination if made.

For the foregoing reasons, Applicants request withdrawal of the rejections.

C. Roitman in view of Kaneko, Ohno, and Yamazaki

The Office Action (1) rejects (§6) claims 105, 107-111 and 126-127 under 35 U.S.C. §103(a) over Roitman in view of Kaneko, U.S. Patent No. 5,705,302 to Ohno et al. (Ohno), and U.S. Patent No. 5,929,464 to Yamazaki et al. (Yamazaki); (2) rejects (§7) claim 112 under 35 U.S.C. §103(a) over Roitman in view of Kaneko, Ohno, and Yamazaki, and further in view of Ra; and (3) rejects (§8) claim 112 under 35 U.S.C. §103(a) over Roitman in view of Kaneko, Ohno, and Yamazaki, and further in view of Tsuchiya. Applicants respectfully traverse the rejections.

Regarding independent claims 105 and 110, the applied references fail to disclose or render obvious: (1) "forming the plurality of the first electrodes at predetermined positions on a substrate, the first electrodes being electrically coupled to corresponding ones of a plurality of transistors" and "forming an insulating layer so as to surround the predetermined positions"; and (2) "enhancing an affinity to liquid of the first electrodes at the predetermined positions relative to an affinity to liquid of the insulating layer".

The Office Action acknowledges that Roitman fails to disclose a plurality of first electrodes, but cites to Kaneko as disclosing holes 14 in shadow mask layer 13 (Fig. 3; paragraph [0011]). Kaneko discloses manufacture of an electrolumenscent element including forming mask layer 13 on electrodes 12, the mask layer 13 having holes 14 (Drawing 1). Red light emitting layer 15a, green light emitting layer 15b, and blue light emitting layer 15c are formed in different ones of the holes 14 (Drawing 1). The Office Action alleges that holes 14 correspond to pixels. However, as discussed above, the holes 14 define subpixels. The electrodes 12 are formed in strip form, each electrode 12 overlapping with a plurality of red, green, and blue light emitting layers 15a-15c, respectively, in plan view (Drawings 1-3 and 5-8).

Regarding independent claims 105 and 110, even if Roitman is modified by Kaneko, the combination fails to disclose "forming the plurality of the first electrodes at predetermined positions on a substrate" and "forming an insulating layer so as to surround the predetermined positions" (emphasis added) because Kaneko's mask layer 13 is not formed around the same positions as the positions of the electrodes 12.

The Office Action acknowledges that Roitman fails to disclose a difference in wettability between a first electrode and an insulating layer, but repeats the same rationale that it would have been obvious to combine the embodiment of mask 131 and the embodiment of hydrophobic or hydrophilic regions that the Office Action provided in relation

to the rejection over Roitman in view of Ra. As discussed in relation to the rejection over Roitman in view of Ra, it would not have been obvious to modify Roitman to combine the embodiment of mask 131 with an embodiment of enhancing the hydrophilicity of the regions in the wells of the mask 131 because one of ordinary skill would have understood that no additional benefit would accrue from this modification and that the proposed modification would add additional manufacturing steps, cost, and complexity.

While the Office Action alleges that one of ordinary skill would have understood that combining the two embodiments would further ensure confinement, this is not true because mask 131 is formed higher than the electroluminescent layer and, thus, one of ordinary skill in the art would have recognized that mask 131, as a physical barrier, would have no difficulty containing the droplets 138 because gravity would ensure that the electroluminescent material would not exit from the regions between the walls of mask 131. Further, Roitman does not disclose that there is a problem with mask 131 containing the electroluminescent materials deposited as droplets 138. Thus, it is clear why Roitman discloses the use of hydrophilic regions as an alternative to the use of mask 131. For these reasons, one of ordinary skill in the art, taking the applied references as a whole, would have had no reason combine mask 131 with hydrophilic regions because this modification would provide no benefit over mask 131 alone as taught by Roitman, while adding the detriments of extra cost, extra manufacturing steps, extra time of manufacture, and extra complexity.

The Office Action acknowledges that Roitman fails to disclose enhancing the wettability of a first electrode, but cites to Ohno as curing this deficiency. The Office Action cites to Ohno as disclosing use of RF plasma and UV radiation (citing to col. 9, lines 13-25) and alleges this produces a hydrophobic surface in an ITO film. The Office Action alleges that it would have been obvious to modify Roitman by Ohno in order to make the ITO film more wettable to the hydrophobic Xylene solvent of Roitman.

The Office Action mischaracterizes the teachings of Ohno. Ohno discloses a color filter 100 having black matrix layers 15 dividing color layers 14, the color layers 14 having transparent conductive particles with hydrophobic surfaces at 5% to 50% by volume (Fig. 1; col. 10, lines 48-50). Ohno discloses that the transparent conductive particles have the hydrophobic surfaces (col. 9, lines 13-14), but does not disclose whether the color layers 14 containing them have a hydrophobic surface. Ohno discloses that the adding of the transparent conductive particles to color layers 14 is done to increase the conductivity of the color layers 14 (col. 10, lines 51-60), not to enhance the wettability of first electrodes (e.g., transparent conductive layers 12) in relation to an insulating layer (e.g., black matrix layer 15), as claimed. Ohno discloses that the application of the RV plasma or UV radiation is done to cause the coupling of a functional group onto the transparent conductive base particles (col. 9, lines 13-25), the functional group providing the hydrophobicity. Ohno discloses that the hydrophobicity of the transparent conductive particles is done by introducing a silase coupling agent to the surfaces of the transparent conductive base particles (col. 10, lines 61-64).

In summary, Ohno discloses: (1) that the transparent conductive particles have a hydrophobic surface, not necessarily any surface of a film containing them; (2) that it is the color layers 14 that contain the transparent conductive particles; (3) that the RF plasma / UV radiation does not increase the hydrophobicity because it is used to cause a coupling between particles prior to a later stage that increases hydrophobicity; (4) that a silane coupling agent is required to increase hydrophobicity.

There is no reason to make the combination as proposed, taking the references as a whole, because: (1) the substrate of Roitman is not a color layer; (2) Roitman's substrate would not benefit by being conductive even if the transparent conductive particles of Ohno could be added to it; (3) Roitman does not disclose any use of a silane coupling agent that

would benefit by using Ohno's RF plasma / UV radiation process. Even if combined, Ohno's UV radiation process would be used to couple a silane coupling agent to component particles of some layer in Roitman, not to enhance any hydrophobicity as claimed. Thus, Ohno fails to cure the above-noted deficiencies of Roitman and Kaneko.

Yamazaki, cited as allegedly disclosing an active matrix EL device, fails to cure the deficiencies of the other applied references.

For the foregoing reasons, Applicants request withdrawal of the rejections.

D. Roitman in view of Kaneko, Ra or Tsuchiya, and Yamazaki

The Office Action (1) rejects (§9) claims 123 and 128 under 35 U.S.C. §103(a) over Roitman in view of Kaneko and Ra, and further in view of Yamazaki; and (2) rejects (§10) claims 123 and 128 under 35 U.S.C. §103(a) over Roitman in view of Kaneko and Tsuchiya, and further in view of Yamazaki. Applicants respectfully traverse the rejections.

Regarding independent claim 123, the applied references fail to disclose or render obvious (1) "forming an insulating layer so as to surround the pixel electrodes"; and (2) "arranging an optical material at the pixel electrodes, a first liquid repellency of an inner wall of the insulating layer to a liquid or a liquid material being lower than a second liquid repellency of an upper surface of the insulating layer".

The applied references fail to disclose or suggest feature (1) quoted above for the same reasons discussed above in relation to Roitman and Kaneko (see section C above). The applied references fail to disclose feature (2) quoted above for the same reasons discussed in relation to (a) the unobviousness of the combination of the two embodiments of Roitman using mask 131 and using hydrophobic or hydrophilic regions, and (b) the unobviousness of the combinations of Roitman and Ra (see section A above) and Roitman and Tsuchiya (see section B above).

For the foregoing reasons, Applicants request withdrawal of the rejections.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

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